

ABSTRACT

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RECONSTRUCTION OF CRANIAL CRUCIATE LIGAMENT IN DOGS

With the synthetic ligament STIF-VETLIG GLOBAL-

PROSPECTIVE STUDY FROM 2012 TO 2018 IN 49 CASES

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INTRODUCTION

For surgery of the cranial cruciate ligament (CCL) deficiency in dogs, the most common techniques are compensatory, modifying the biomechanics of the stifle. The dynamic stabilizations of the stifle (TPLO, TTA) are quite invasive (tibial osteotomies), with major complications, although rare, that can potentially be dramatic, but moreover the recovery can be very restricting for the dogs and their owners^{1,2}. The extra-articular techniques are often source of disappointing results in big dogs. Concerning the intra-articular autogenous transplants, despite the difficulties linked to the donor site, the 6 to 9 months needed for recovery by the transplant of an acceptable mechanic solidity, makes them unusable in veterinary surgery.

The experience gained in human surgery for over 25 years using the last generation of synthetic implants showed that they are reliable and perfectly tolerated^{3,4,5,6}. The technology, with specific implants adapted to dogs (implant STIF-VETLIG GLOBAL tm) is the one we have decided to use for this prospective study that begun in 2012 to try to improve CCL surgery, treating the problem by its basis, meaning by reconstructing the ruptured ligament itself to suppress all pathological laxity and restore the physiological biomechanics of the stifle.

The 12 first cases of this study were the subject of a veterinary doctoral thesis (Dr PAGES) at VETAGROSUP LYON⁷ and its results encouraged us to pursue it.

MATERIAL AND METHOD

45 dogs with a total of 49 CCL ruptures presented at the Veterinary Clinic La Cardelle (06) between December 2012 and March 2018 were included in the study, with the owners' clear consent. Dogs that had a previous surgery on the affected stifle were excluded from the study. The CCL lesion diagnosis was established clinically. The initial clinical exam showed a limp of the affected leg, associated to a sign of anterior drawer evaluated comparatively with the other side by the same operator (PLD). The X-Ray signs were compatible with the LCA lesion (articular effusion more precisely).

Under general anaesthesia (specific protocol for each patient), a large shave and a careful preparation of the skin are made. A prophylactic antibiotherapy is initiated at the induction (Augmentin, 20mg/kg IV). The surgical technique duplicates the one used in humans. By an antero medial approach of the stifle, an arthrotomy is made. The patella is laterally dislocated, and the resection of infra patellar fat pad allows the intra-articular exploration. The CCL rupture is confirmed. If existing, the meniscal lesions are treated by a partial meniscectomy. The hyper flexion of the stifle enables to properly see the bottom of the inter condylar notch and then to insert, from inside out a 2mm K wire into the lateral femoral condyle from the center of the attachment of the CCL towards the upper external lateral cortex. The lower one-third of the lateral edge of the caudal cruciate which is crossed by the K wire is a good landmark for its insertion. A cannulated drill bit (3mm, 3,6 or 4,2mm of diameter is used according to the animal's weight and the size of the ligament) guided by the surgical pin, is used to create a femoral tunnel. The same surgical pin is then inserted through the femoral tunnel, into the tibial insertion of the CCL to come out distally on the medial face of the metaphysis. This K wire is used to guide the drilling of the tibial tunnel from outside-in. Two transversal bony tunnels are then drilled (not done at the beginning of our study), proximally and distally to the previous ones, in the femur and the tibia. With the help of a thin tube and a metallic loop, the STIF ligament is passed through the tunnels. The intra articular part of the implant is only made of longitudinal fibers so called "free fibers" that are the particularity of this implant, giving its resistance to fatigue due to the physiological stresses while flexion and torsion⁸. Therefore, the free fibers need to be well adjusted in the joint and the braided area placed in the bony tunnels. Then the implant is fixed in the femoral tunnel using an appropriate interference screw. After reduction of the patella, the isometry during complete range of motion is checked. The implant must control the anterior drawer, but it must not be tensed under any position it must not slide into the tibial tunnel during motion. Once this adjustment is made, the implant is fixed in the tibial tunnel. For an immediate solidity, this primary fixation is doubled by the passage and the fixation of the implant by two interference screws in the two transversal tunnels perpendicular to the femoral and tibial axis.

After a careful lavage with saline the joint is closed layer by layer. We finish by a humid cotton bandage slightly compressive for 48 hours.

No immobilization is needed for the animal and it will resume its normal activity when he feels like it.

Only a bandage and a moderate rest (to ensure the healing of the soft tissues) are recommended until the skin sutures are removed. The post-operative follow-up includes the removal of the sutures 10 to 12 days after the surgery, an orthopaedic control at 1 and 3 months post-surgery and a questionnaire for survey is sent 1 year after surgery.

RESULTS

Forty-five dogs were included in the study. Among them, 4 have had a bilateral injury during follow up and have been operated, that is a total of 49 implants. Except for 1 dog (Labrit 13 kg), all the dogs in the study weighed over 20 kgs. Four dogs weighed 70 kgs or over. 2 dogs had TPLO before on the other stifle and one dog had a stabilization by the Flo method. The average age was 5,3 years old at surgery, 53% were females, 47% males.

The average duration of a post-surgery follow up is 28 months (from 3 months to 6 years). At the end of the follow up, 98% of dogs (48 cases) do not show any sign of limping and orthopedic exam is

normal in 89,9% of cases (44 cases). It shows that there is a good or an excellent functional result in 98% of cases (48 cases).

The anterior drawer is absent in 89,9% of cases (44 cases). It is inferior to 5 mm in 6,1% of cases (3 cases). In 1 case, at the end of the follow up the anterior drawer is marked (between 5 and 10 mm). However, the affected dog does not show any signs of limping while walking or trotting. Its owner does not report any impact on its quality of life. The last case presents a major anterior drawer >10 mm, because of the implant sliding after the 2 first months post-surgery before performing the systematic double fixation, associated to a limp recurrence. In 95,9% of cases (47 cases) there is an excellent or good mechanical result.

The survey was completed by the owners for 35 implants, with an average of 18 months post op:

- Weight bearing was back on the first day for every dog over 20 kg. Strangely the small dog of 13 kg got it back later, on the fourth day.
- For 33 ligaments/35 reconstructions the owners just found excellent the simplicity of the post-operative period. The dog finds immediately its autonomy back and does not need any special attention once the wound healing is done. This follow up simplicity was particularly well noticed by the owners that had already been through the TPLO experience that was considered way more complicated.
- The dog's owners estimated that their dog had fully recovered within 2 months.
- In total 33 reconstructions led to a total satisfaction. 1 owner was not entirely satisfied as his dog that used to follow him on a 20-km bike ride before his injury, now starts to snort after 10 km. 1 owner is not satisfied as his dog has a sporadic limp.

COMPLICATIONS

- On the 49 ligaments operated there were 3 superficial skin infections and 1 under skin infection that were all cured with antibiotics (cephalosporine) without any other surgery.
- 3 primary fixations have been inefficient in the 2 months post-operatively between 2012 and 2014 and have led to a review of the technic with a systematic double fixation in the transversal tunnels. Ever since there no other problem of this kind has occurred.
- No major complications have occurred.

DISCUSSION

The bad reputation of the synthetic implants of the 1980's has brought a lot of doubts within the human and veterinary surgeons who have refused to use them. However, the results obtained in human surgery for over 20 years, with the last generation implants are very positive^{3,4,5,6}. The very porous intra articular area of the free fibers promotes the fibroblastic invasion and the reconstruction of a collagenic structure as it seems to increase the life time of the implant due to a better resistance to flexion and torsion. If the TPLO gives good results, we must admit that it does not solve the laxity problem, that can only be solved by the reconstruction of the cruciate ligament. The publications testing the biocompatibility of these implants on humans and animals (rabbit, sheep) show that there is an intra articular fibroblastic invasion and reconstruction of a collagenic structure⁹.

Some limits exist in our study, especially the absence of devices enabling us to measure objectively the anterior drawer like it exists for humans. Also, the evaluation of a full recovery could have been done with the help of pressure sensors. However, the fact that it was held in a private veterinary clinic did not allow us to consider it.

The confirmation of a dynamic stability of the stifle In Vivo after stabilization by this technic would be necessary, to confirm the return to normal biomechanics of the joint¹⁰.

CONCLUSION

The reconstruction of the CCL by the STIF- Vetlig Global intra articular synthetic implant gives good to excellent results in 98% of cases. This sustains the comparison with the current recognized techniques. It is a minor invasive surgery that we can consider performing under arthroscopy, which consists in creating only small bony tunnels without any other irreversible damage. Finally, the fast recovery and the post-operative easy period are the two major advantages for the owners, which is the frequent feedback, in particular when they had already undergone a different surgery on the contralateral member (TPLO).

According to the authors the reconstruction of the CCL using a STIF implant definitely deserves to be looked at by the Veterinary surgeons.

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